Shallow fracture formation and fluid mobilization during diagenetically driven deformation: the Tertiary Badlands chalcedony vein and clastic dike systems of South Dakota and Nebraska.

Update 2011

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Project goals:

a) To provide students with formative undergraduate research experiences.

b) To investigate how fracture systems may be developed by changes in sediment during shallow burial.
Project significance:

Contributes to STEM education, and geology major recruitment and retention.

Contributes to understanding fracture systems, which in turn is important in petroleum geology, hydrogeology and structural geology.
Products to date:

- 16 undergraduate participants supported to date.
- 5 presentations at professional meetings (4 by students).
- 4 senior theses completed, with all 3 authors accepted into graduate programs.
- 2 senior theses in progress.
Progress to date continued:
- 7 new field sites mapped and sampled.
- GIS data base of chalcedony vein and clastic dike orientations expanded.
- new method for visualizing spatial variation in degree of strike organization developed.
- expanded and data informed model for how these fracture systems form.
- one manuscript published, two in prep.
- smectite-illite anomaly detected in association with chalcedony horizons.

Above: Raw plots and models of chalcedony vein strike distributions, with sites that vary from unorganized to partly organized.

XRD analysis

More to come!